

SYMPOSIUM RECORD CABLE SESSIONS

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FRIDAY, JUNE 11, 1993

CABLE C1

Morning, 10.00 - 12.30

Hyatt

Advanced Cable TV Networks

Topic Chairman: Mr. V. Steiner, D

Vice Chairman: Mr. V. Brugliera, USA

Fiber Optic Technology has opened a wide variety of options for the design of Cable TV Networks. These options in turn give rise to opportunities for improved capacity, reliability, increased signal quality, and new services. These advanced networks and related components will be considered in this session.

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18TH INTERNATIONAL TELEVISION

SYMPOSIUM AND TECHNICAL EXHIBITION

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Digital On-Screen Display

A New Technology for the Consumer Interface

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INTRODUCTION

After two decades of unprecedented growth the cable industry is faced with several trends. First, an expansion of program choice provided by increased channel capacity and new programming vendors. Second, increased complexity for the subscriber as a result of interface problems between set-top terminals and new features on television receivers and VCRs. Third, cable faces formidable competition for its premium pay services from videocassette rentals and will soon face competition from DBS and telephone companies. Fourth, the United States has enacted regulatory legislation that has negatively impacted cable revenues. The cable industry in the United States needs additional sources of revenue in this environment. As the age of information makes its way into the cable industry it will be a new and important source of revenue. It is essential that a means be made available to bring and display this information on customer's television receivers in an easy to use customer friendly format. At present program guide information and individual subscriber messages are the primary data that cable operators are interested in bringing into subscribers' homes. In the future this data will be greatly expanded. Cable growth has matured, competition is here and regulatory pressures on subscriber fees emphasize the need for additional sources of revenue. The technology described is an important element in satisfying subscriber use of cable services and increasing the perceived value of present and future services.

Expanding Choice

The dominant feature of cable television in the United States is the large number of program choices available to cable subscribers. As the number of available channels increased during the last two decades due to the raising of cable bandwidths to 450, 550, 750 and 1,000 MHz, cable program offerings have gone from the initial relay of off-air broadcast channels to cable systems offering as many as 150 channels of programming. A transition from analog to digital technology incorporating video signal compression techniques offers promise of over 500 channels of programming. Despite all these choices, a typical subscriber regularly watches only six to eight channels. The problem facing the subscriber is how does he or she make a choice from among all the program offerings that are available? If the choice is expanded to include other services such as data, how do we assist the subscriber in making maximum use of these choices? Subscribers will need assistance to help select and narrow the ever increasing number of choices otherwise it will be too difficult for subscribers to navigate through these choices.

Subscriber Interface

The cable industry has seen consumer electronics technology and changes in program tiering diminish the need for set-top addressable decoders. Television receivers with cable compatible tuning minimize the need for a set-top converter for tuning access of unscrambled channels. The collapse of many tiers into an expanded basic tier has further reduced the need for an addressable converter for conditional access. Television receiver and VCR technology added many desirable features to consumer electronics products. Subscribers with a cable compatible television receiver, basic service and a few premium channels have been serviced with traps. As a consequence subscribers have been able to enjoy all the features of their television receivers and VCRs. An unforeseen result of the 1992 Cable Act will require flexible tiering and the use of conditional access technologies available with addressable converters. The need to introduce an addressable set-top converter introduces complexity in program choice and may interfere with subscribers use all of the features in their products.

Competition

Subscriber growth and economic vitality of the cable industry has happened with little effective competition except for impacting premium pay service growth. Videocassette rentals have negatively impacted premium pay services and have grown into a multi-billion dollar industry on their own. The primary attraction has been earlier release windows for movie rentals and the large choice of titles available at the video store.

Wireless cable has been a less effective competitor due to lack of programming and financing. However, within a year, direct broadcast services (DBS) with much improved technology will compete directly against cable with the advantage of deep pocket financing and programming variety.

The telephone industry has been restricted from directly competing with cable. However the success of cable and the strong passage of the Cable Consumer Protection Act of 1992 indicates that telephone competition is a when-not-if situation.

Additional Sources Of Revenue

If cable is to sustain its growth and economic vitality, the industry must not only maintain its present subscriber base but also grow and obtain new revenue sources. Growth at past rates is a formidable undertaking given cable's present high subscriber penetration and number of homes passed. Additional revenue must come from new services. These new services must be available in a subscriber friendly manner to fulfill their promise to subscribers and to cable operators.

SYSTEM COMPONENTS

A typical system along with some optional components is described below.

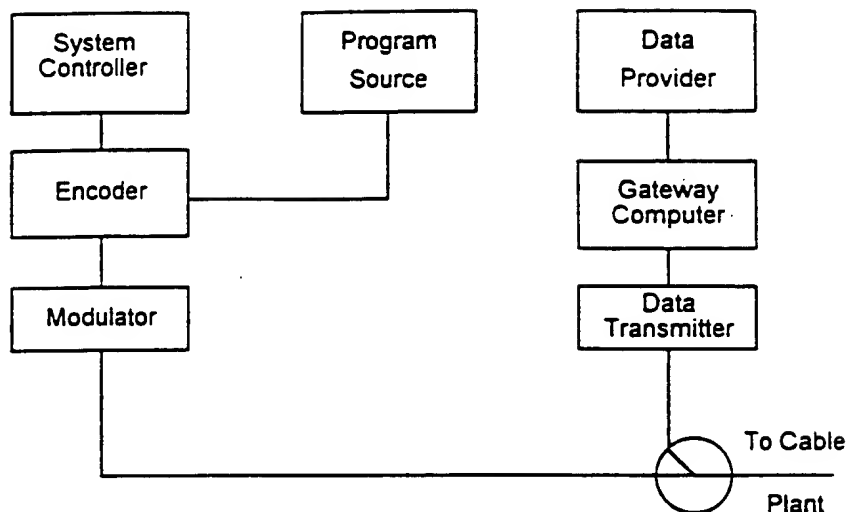


Figure 1. System Components

Gateway Computer

The OSD (on-screen display) Information Gateway Computer can be considered an information focal point. It is designed to receive dynamic information such as program guides, weather reports, sports scores, stock quotes and other services from many outside data providers, and then translate and output that data to the subscriber's decoder.

The Gateway Computer provides the necessary interfaces to gather data from many outside sources and download it to subscriber decoders. In addition to sending this data (schedule guides, stock quotes, weather information, etc.) to decoders, the Gateway is also responsible for how information appears in the on-screen display.

The Gateway has been designed to be flexible because of the various formats of dynamic data sources available and being developed. To allow the simultaneous collection of data in many different formats, the Gateway software runs on a powerful 486 computer utilizing the OS/2 operating system. Data is stored in an on-line relational database with a standard SQL interface.

The term "Dialog" refers to those commands which define how the decoders react to subscriber input. For example, when a subscriber presses a certain button on the remote control unit, one could instruct the decoder to display either the program schedule guide, or to move to another menu. With the set-top terminal's dialog authoring software, the system operator defines how the decoders in the system operate. New behavior can be downloaded to the decoder while it is operating in the system. No downtime is required nor is a truck roll necessary to retrieve the decoder for modification.

The dialog authoring process involves four basic steps:

1. Receiving the data
2. Determining which data is to be provided to a particular subscriber.
3. Defining how the subscriber accesses the data - which key is used to access the information?
4. Defining how the information appears on the OSD.

The first step is already provided via the "Gateway", which is capable of accepting program scheduling information, stock quotes or weather information. The remaining three steps are performed by the "dialog authoring" portion of the Gateway software system.

OSD Data Transmitter

The OSD data transmitter works in conjunction with the Gateway Computer, providing an asynchronous link from the gateway to the set-top terminal's on-screen display. It is the vehicle that takes the data from the gateway to the decoder. Data is transmitted at a rate of 9600 baud at a standard frequency in the FM band, although other frequencies and higher baud rates can be accommodated.

The gateway computer is designed to receive data inputs asynchronously from a variety of sources concurrently. The cable system can choose which (if any) services to offer subscribers. The number of available sources continues to grow as more and more companies are offering data services to the cable industry.

Data can be delivered to the gateway in a variety of ways: satellite, modem, or even by a common computer floppy disk. The gateway deciphers the data and transfers it to OSD format. In a matter of seconds, this process will be completed, and the data will move on to the out-of-band transmitter and finally to the subscriber.

System Controller

The Controller is a multi-tasking, real-time controller running on a 386 or 486 PC-AT compatible computer. Its basic task is to maintain conditional access decoder authorizations. Specifically, this involves defining channels and how they are used, program scheduling, decoder authorization, configuring various system parameters, and general system administration.

The system controller is designed for optimum control of all types of PPV (Pay-per-View) as well as day-to-day management of an addressable system. Through the use of an ASCII asynchronous interface, up to eight PC-compatibles can operate remotely using standard PC modems. Multiple controllers can also be networked to one management computer.

The system controller is specifically designed for PPV marketing, offering many ordering options. Subscribers within a two-way cable system can upgrade to a premium service on impulse 24 hours a day, seven days a week. "Season-Ticket" schemes allow marketing of PPV events either individually or as weekend, half-season or full-season sports packages. Advance buying is another option, allowing the controller to accept orders from the management computer as soon as the program is scheduled.

Channel monitoring, opinion polling and other interactive services are also available within two-way systems.

Encoder

Encoders perform two functions: First, they scramble the video signal. Second, they insert data into the VBI which enables the controller to communicate with decoders.

Modulator

The modulator determines the actual channel frequency on which the video is transmitted.

Data Receiver (optional)

The data receiver processes messages sent by decoders with two-way capabilities and sends the data to the system controller. The term contention refers to the fact that the decoders contend for the use of the upstream data carriers in a non-predetermined fashion.

Decoder

The set-top terminal is a self-contained, integrated baseband signal processor. Externally, the set-top terminal appears to operate as a standard converter; i.e., it receives the cable input and delivers a single channel output to the television.

Internally, however, the set-top terminals utilize two distinct processors. The first is the Conditional Access Processor, which is responsible for receiving and interpreting the in-band messages which control decoder scrambling. The second processor is the Dialog Processor. Its responsibility is to receive and interpret the out-of-band data being transmitted by the Gateway computer.

The decoder also includes many subscriber convenience features such as a set-top keypad with up/down channel scan, favorite channel scan, unlimited parental control memory, program timer, sleep timer, optional RF bypass, volume control, and even has an optional IR blaster for automatic VCR recording control. In addition, the set-top terminal displays these and many other features in a user-friendly on-screen format.

A standard 550 MHz, 84 channel tuner is used with a choice of models using either channel 3 or 4 for output, plus an optional RF bypass.

Out-of-Band Data

Unlike most addressable decoder systems, the set-top terminal utilizes in-band data for conditional access and out-of-band data for on-screen information. This configuration delivers two important benefits. Using in-band data for conditional access provides increased security and facilitates the distribution of the system controller's processing power over many channels, allowing the system to use the conditional access data differently depending on which channel is carrying the data.

In-band data transmission of viewer guide information for terrestrial broadcast channels may be adequate because there are a limited number of broadcast stations in any given geographic area. Cable systems have many more channels and the required program database is much larger. The data rate and effective capacity of in-band systems, typically in the vertical blanking interval, is insufficient for the information necessary for a cable system and its many channels of

programming. Using out-of-band data for on-screen information is a much more efficient method of supporting information services such as viewer guides. Installation and upgrades of such services takes only minutes using an out-of-band data transmission scheme.

Expanded Downloadable Control

The set-top terminal's advanced software allows control from the headend for convenience and marketing flexibility. Because of the system architecture, all on-screen data is fully downloaded. The following features are also controllable from the headend:

- Downloaded PLL data for STD, HRC, IRC or custom tuning patterns
- Channel mapping allows instantaneous change for all decoders or for categorized groups
- Factory assigned PIN for parental control and for PPV purchasing can be changed from headend
- Forced Tuning
- System clock
- Barker Channels - One per encoder
- Downloadable operational behavior to the decoder for flexibility and compatibility with future upgrades

PPV Barkering and Support

Marketing PPV is easy with an on-screen display system. Any number of channels can have a designated barker message generated by the OSD circuitry. Different groups of decoders can also have different barker messages generated. PPV capability for the addressable decoder control system is provided by three distinct methods: MAPPV (Management Activated Pay-Per-View) ordering using the billing computer to process orders, ANI ordering (telephone interface), and two-way channel ordering (upstream frequencies). The overall system is managed by the system controller and associated software.

Management Activated Pay-per-View

For subscribers within a one-way cable system, actual PPV capability is controlled by the management computer which is used to initiate the purchase (or cancellation) request of PPV programs. This is accomplished one of two ways: by telephoning the subscription office and speaking with an operator (CSR) to purchase (or cancel) a PPV program or by using the push-buttons on the telephone to enter a special code for the PPV program. The order is processed by the management computer which directs the Controller to transmit the authorization (or deauthorization) to the subscriber's decoder based on the PPV schedule set up in the MAPPV software system.

ANI

PPV capability may be also supplied by the telephone system and an ANI system. Rather than take ANI orders from the management computer, requests are handled directly through the controller. To order a PPV program, the subscriber simply dials a seven to ten digit telephone number using either a rotary or a push-button telephone. This number is then recognized in the system controller as corresponding to a particular program. The purchase (or cancellation) request is recorded, and the authorization (or deauthorization) for the program is transmitted to the subscriber's decoder, and the information is then uploaded to the management computer.

Real-time Two-way

Subscribers within a two-way cable system can order PPV simply by pressing the BUY key and entering their four-digit PIN. The decoder transmits the purchase (or cancellation) request to the controller which, in turn, transmits authorization back to the decoder. Events can be purchased from the program guides or from the channel showing the event.

Telephone System

The telephone system receives PPV transactions from subscribers in systems with ANI capabilities. The requests are then transmitted to the system controller asynchronously via modems where they are either accepted or rejected.

Management Computer

The system may include a management or billing computer which is used primarily for recording premium service purchases and often provides multiple terminals for CSR order entry and subscriber account management. This computer is normally connected to the system controller for decoder authorizations and other functions. In these cases, the system controller will serve more as a "slave" to the management computer, in addition to actually transmitting the authorization lists to the decoders. Also, the management computer need not reside with the system controller. If the headend is remote, the management computer may communicate with the system controller via modems.

PROGRAM GUIDES

Printed Listings

Program guide listings are available in print form in daily newspaper listings, periodicals such as the Sunday newspaper weekly listings and monthly guides available from the cable operator or by subscription. Determining their viewing choices requires that subscribers actively engage in reviewing this material. This is often a daunting task for people who prefer passive entertainment and must search for program information in subdued lighting..

On-Screen-Listings

As a partial answer to facilitating programming choice, on-screen-displays of program listings have been available. Typically these are barker channels with scrolling listings displayed in chronological sequence, often with a picture-in-picture preview selection for future programming. These on-screen-displays have the advantage of being more current than printed guides.

However there can be a considerable wait if one happens to come upon the listings just after the time of interest.

The typical barker channel scrolling program guide lacks an important feature - interactivity. Printed guides are user unfriendly and they cannot be queried by the subscriber to facilitate and shorten the search for programming. The quest for interactivity has led to a variety of technological approaches to solve this subscriber interface problem.

In Europe, where teletext service is more prevalent, a system has been developed that places program information as digital data in the vertical blanking interval of the program. This information contains program title, type, time of broadcast, duration, etc.. Integrated circuits have been developed to extract the information and display it. This allows not only a text display in response to a program query, but also permits programming a VCR and accommodating variable program lengths.

A similar system has been proposed in the United States. The government mandated captioning legislation for television receivers requires a caption text decoder and display capability in television receivers. An Electronic Industries Association committee has published a proposed standard that would use field two of the Line 21 captioning data to carry program information. Television receivers equipped with the necessary circuitry would be able to display program data in text form. The system would also allow easier programming of VCRs if they were equipped with circuitry to utilize the data available in Line 21.

NEW SET-TOP TECHNOLOGY

The need to communicate with subscribers has never been greater. The ability to communicate has been considerably enhanced with a new interactive on-screen display (OSD) system. This OSD system puts subscribers a touch-of-a-button away from electronic program guides, special converter features, messages, pay-per-view and other data services.

The most effective implementation of on-screen menus provided by the set-top decoder uses four basic categories, color-coded for easy identification. The display is based on a menu system featuring four main file folders:

- **Bulletin Board**, which sends information such as service outage announcements or pay-per-view promotions to all subscribers or just to selected groups.
- **Features menu**, which contains subscriber convenience features such as program timer, sleep timer, favorite channel list, parental control, and the setup sequence.
- **Information folder**, the section where one can offer extra services, such as stock quotes, weather reports, individual messages, billing information, or even a shopping section with local advertising.
- **Viewer Guide section**, which displays programming information downloaded from services such as InSight Telecast® or Prevue Networks Trakker® system. Because of the "gateway" architecture of the system, the menus can be customized to suit a particular market. Most screens and features can be added or deleted based upon the specific needs and capabilities of each cable system.

Subscribers simply access and sort through files by pressing a "Menu" key on the remote.

Bulletin Board (blue menu)

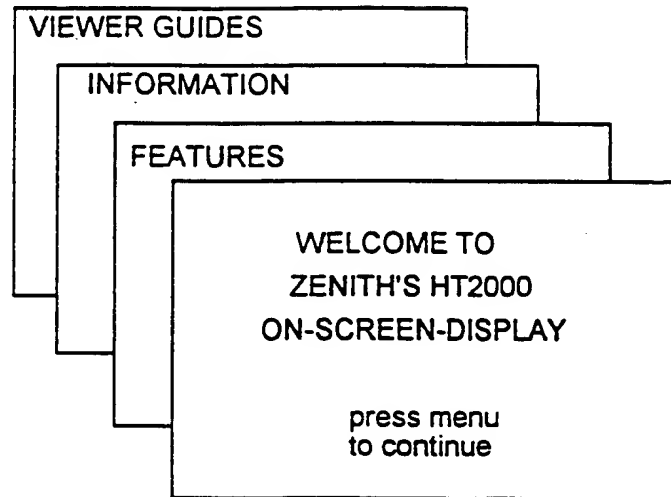


Figure 2. Bulletin Board

This is the first screen, see Figure 2, a subscriber sees when the converter is turned on. The 13 X 8 area can be used for either system-wide messages and barking, or for sending "categorized" messages to different subscriber groups. This capability is resident within the box and does not take up channel space. The bulletin board may be disabled by the subscriber in the SETUP section if so desired. However, the operator retains the ability to override this feature should an emergency message become necessary.

In the default mode, when the subscriber turns on the converter at the start of a viewing session, the decoder on screen menus appear with the bulletin board in the front, and then times-out after five seconds. This setup option allows the subscriber to choose between three turn-on options: the menus always appear at the beginning of each viewing session (default mode); off unless the bulletin board contains new information; off unless the subscriber uses the "menu" button. Note that if the subscriber chooses to leave the menus off at turn-on, the operator retains the ability to override should an emergency message become necessary.

Two options are available for text display over live video—either white text with no background, or white text on a black background. The subscriber has the option to choose which display mode he finds easier to read.

Features (cyan menu)

The features menu displays decoder-specific features and options in a user-friendly format as shown in Figure 3.

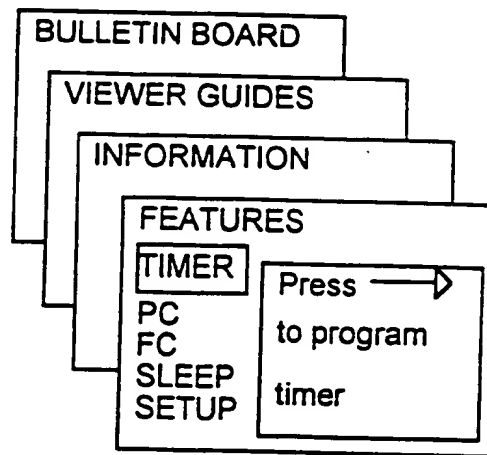


Figure 3. Features Menu

Timer. The 7-event, 31 day timer programs the decoder to turn on at a subscriber-determined date and time for VCR recording. In addition, depending upon the program guide service, an optional IR "Blaster" automatically sets the VCR timer to correspond with the setting on the converter timer.

There are two methods of setting the timer. One is to access this feature through the FEATURES menu. This method requires manually entering the requested program information: date, start time, length of program, and channel number.

The subscriber can also set both the converter timer and his VCR timer (using the IR "blaster" option) automatically through the on-screen guide.

Favorite Channels. This feature allows the subscribers to choose their most frequently used channels to be scanned using the "FC" button on the remote control unit. In addition, the selected channels will be used for the FAVORITE CHANNELS program guide in the VIEWER GUIDES section. Any number of channels may be included in the favorite channel memory. To add a channel, the subscriber simply presses the channel number and then the * key on the remote. The new channel now appears on the display. To remove a channel, enter the channel number and then the # key. The channel disappears from the list.

Parental Control. Viewing access to any number of channels can be controlled using the subscriber's factory-assigned four-digit PIN. Upon an attempt to view a controlled channel, the picture will be blanked and a lock icon will appear in the upper right of the screen.

The subscriber will need to enter his PIN before access to the parental control sub menu is granted. Once access is granted, the screen shows whether the PC is currently on or off. An LED on the decoder will also be lit when the PC is activated. The subscriber may proceed to the next screen if he wishes to view or change the list of channels being controlled. The procedure for adding or deleting channels is identical to that of the favorite channel sequence; to add a channel, enter the number then the = key, to delete a channel, enter the number then the # key.

If the PIN is forgotten or misused by the subscriber, the parental control mode can be disengaged from the headend, and a new PIN can be easily assigned.

Sleep. The sleep timer allows programming to turn off in 15 minutes, or any half-hour increment up to two hours.

Setup. The setup options allow the subscriber to adjust the menus to suit his or her individual preferences.

Information (red menu)

This menu shown in Figure 4, provides various possibilities for on-line information services to subscribers. The actual implementation of these services depends upon which services are available in the particular system.

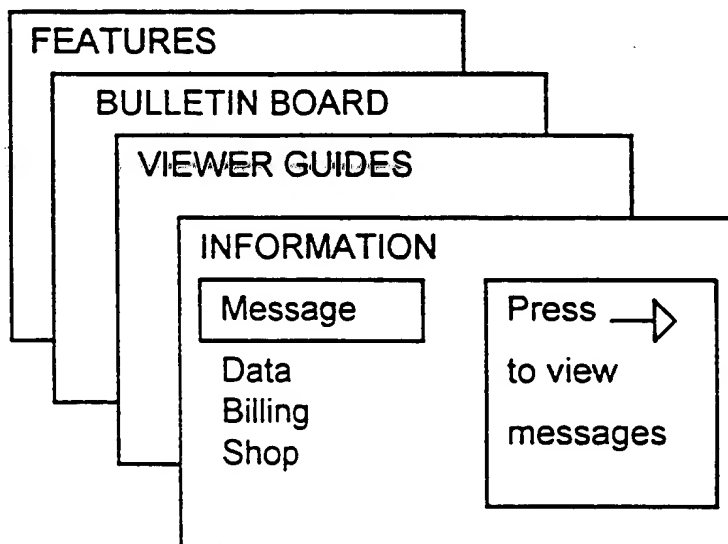


Figure 4. Information Menu

Messages. This menu contains messages to individual customers or to small subscriber groups. The first screen displays a list of all messages in order of receipt, with a different color text to show new or unread messages. To read a message, the subscriber

highlights it, then presses the right arrow key. After a message is read, it can be deleted by simply highlighting it and pressing the # key.

Data. This is an information service network which provides on-line news, sports scores, stock market quotes, and local/national weather or any other available data service you wish to provide

Billing. The billing sub menu consists of two parts, a rate card and the subscriber's actual bill. The rate card is the first screen to appear, and shows the price for each tier of service. At the bottom, the subscriber is asked for his 4-digit PIN (the same as the parental control PIN) before access to his individual bill will be granted. The bill section shows the date and amount due, any payments received, and a new balance. Note that this feature can only be provided if supported by your management system.

Billing information is circulated throughout the addressable system constantly and therefore is up-to-date. Each subscriber can only access the billing information that is specific to his decoder's address. Therefore, it is not possible for one subscriber to view another person's individual bill.

Shopping. This feature is simply a page-by-page listing of local advertisements, specials, or video coupons. The subscriber "pages" through the listings by pressing the "next page" (right arrow) key on the remote.

Viewer Guides (yellow menu)

Viewer Guides, shown in Figure 5, displays interactive programming information supplied by agreement with program data companies such as InSight Telecasting® or Prevue Networks®. The following features may vary depending upon the programming service chosen.

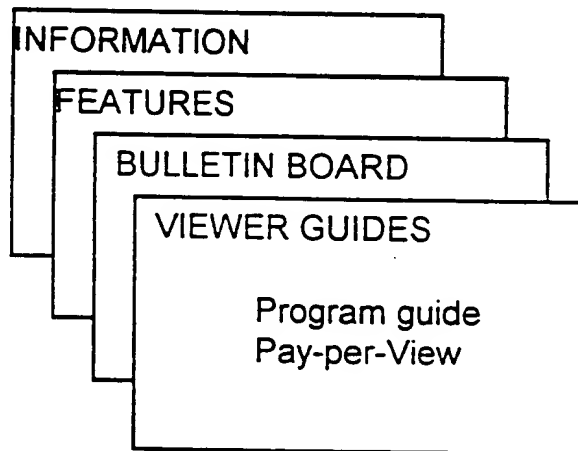


Figure 5. Viewer Guides

Two weeks of programming information can be downloaded to the decoders at a time. The system operator has the option of choosing either a grid format, where the screen displays two

half-hour time slots and up to four channels of information at one time, or a "scrolling" type of format, where a half-hour time slot containing up to eight channels of information can be displayed on the screen at once as shown in Figure 6.

| 8:07 PROGRAM GUIDE 06/15/93 | | |
|-----------------------------|----------------|-----------|
| CH | 8:30 | 9:00 |
| 11 WTTW | SAFARI | OLD HOUSE |
| 13 CNN | NEWS | NEWS |
| 17 WTBS | ATLANTA BRAVES | |
| 27 MTV | MUSIC VIDEOS | |

Figure 6. Program Guide

With the user-friendly remote control, subscribers can scroll through channels, go back and forward in time and can jump ahead by days. In addition, programming can be sorted by themes, by favorite channels or by pay-per-view events. You can even have your own system PPV guide with one-button ordering in two-way systems.

Features

The viewer guides do more than just provide the evening's program line up. If a subscriber wishes to record a program, he can automatically set his decoder to turn on by highlighting the desired program in the guide and pressing the TIMER key on the remote. If his decoder is equipped with the IR "Blaster" option, his VCR may be controlled to record also depending upon the programming service chosen.

The subscriber can also tune channels through the guide by moving the highlight to the box containing channel information and pressing the ENTER button. The decoder will then switch to that channel.

Depending on the guide service chosen, pressing the "INFO" key on the remote displays extended information such as brief program description, starring actors, or perhaps even a critical rating.

The program title can also be displayed at the bottom of the screen as the subscriber scans through channels.

On-Screen Command Remote Control (See Figure 7)

Menu. This key moves from one "parent menu" to the next, or from a sub menu back to the "parent menu". If viewer is in a sub menu such as the "rate card" section of the billing sequence, pressing the MENU button returns him to the INFORMATION parent menu with the highlight resting on "Billing".

Up/Down Arrows. In any menu offering a columnar list of choices, the up and down arrow keys move the highlight through the selections.

Right Arrow. The right arrow key can be considered a "next page" key. Highlighting the desired feature and pressing the right arrow key moves the user to the "next page" of that feature. In Viewer Guide: this key moves you forward in program time increments.

Left Arrow. This key acts as the "back page" key by moving the subscriber back to the previous screen. In Viewer Guide: this key moves you backwards in program time increments.

Quit . This key exits the on-screen menus completely and returns the user to the channel he was watching. The next time the MENU key is pressed, the menus will reappear with the last feature he used highlighted at the front.

Info. While watching a program, the subscriber can press this key to see extended program descriptions where available. In Viewer Guide: This feature can also be used in the guides to display extended information about the highlighted program. Pressing the INFO button again returns the program or guide.

Buy . This key is used to purchase a pay-per-view event from either the actual PPV channel or the guide. From the guide, the subscriber would highlight the pay-per-view program he wishes to purchase and press the BUY key. If the event is purchasable, a screen will appear with further instructions. If the highlighted program is not a pay-per-view event, or it is too late to purchase, pressing the BUY key will display an error message with that information.

Guide. This key provides instant access to the Viewer Guides. The first time the GUIDE button is used in a viewing session, the Viewer Guide parent menu will appear. Each subsequent time this button is pressed until the decoder is turned off, the guide used previously will appear.

Timer. This key toggles the program timer on and off. If used in the guides, this button automatically sets the program timer and/or VCR timer for the highlighted program.

Day Up/Down. When using the guide, pressing this button will go forward and back day by day through programming.



Figure 7. Remote Control

Page Up/Down. In the Viewer Guides these keys move up and down through one "page" of programming to allow quicker movement through many channels of information.

Navigating through the guides

Subscribers scroll through selections using arrow keys on the remote. In the grid format, scrolling left to right moves viewer out in time one program at a time. Scrolling up and down moves up or down one channel selection at a time. The page up and page down keys on the remote move the highlight up or down through the channels four at a time (one "page" or screen) in order to move through the selections more quickly. The day buttons are used when the subscriber wishes to view another day's program choices.

Alpha/Numeric Keypad

Use of alpha-numeric keys provides additional features to the remote control. When in the "Alpha" mode, quick commands allow instant access to features such as messages or PPV confirmation screens.

Direct Channel ID Tuning

The "Alpha" mode provides yet another convenient subscriber feature. Direct channel ID tuning allows a subscriber to tune to a channel using its channel ID rather than the number. This feature is particularly convenient in areas where printed guides cover a broad range of systems and list only the channel ID.

CONCLUSION

What we have described is a system with these salient characteristics:

- Capable of handling data from different providers.
- Processing that data via a Gateway Processor into a common optimized protocol for transmission to addressable decoders.
- System data transmitted in two paths: in-band for conditional access and out-of-band for high throughput data transfer.
- A Dialog Editor that configures the addressable decoder for system and application specific dialogs with totally configurable user rituals.
- Addressable decoders with totally configurable subscriber interface.

The immediate applications for this system are for electronic program guides and pay-per-view. However, the inherent flexibility of the system offers an easy migration path to other data and revenue services. The use of this system in a real-time two-way cable plant allows full use of its interactive capabilities and helps position the cable industry to challenge its new competition.

VITO BRUGLIERA

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- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
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